Marbled Murrelet Habitat Management – Considerations for the new *Forest and Range Practices Act*

Special Report

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Introduction

Section 189 of the *Forest Practices Code of British Columbia Act* allows the Chair of the Forest Practices Board — if the Chair considers it to be in the public interest — to make a special report respecting a matter relating to the exercise of the Board's duties. This is such a report, about the management and conservation of nesting habitats for marbled murrelets in BC.

The *Forest Practices Code of British Columbia Act* and related regulations (the Code), aims to manage and conserve forest resources, including biological diversity and identified wildlife. There is no direct reference to identified wildlife in the *Forest and Range Practices Act*, which was passed by the BC government in late 2002, although it states that plans for forest and range must be consistent with government objectives for biological diversity and wildlife.

The current Code guidebooks, including the *Biodiversity Guidebook* and *Riparian Management Area Guidebook*, describe management practices for most species and plant communities. This approach does not involve management strategies for individual species, because the impact of forest management practices on many species is unknown. In addition, practices that benefit some species can be detrimental to others.

Therefore, the strategy to conserve biodiversity relies on an ecosystem approach. Ecosystems should be managed to provide a range of habitat conditions that, together, are assumed to provide habitat suitable for all native species. Maintenance of diverse habitats is presumed to maintain biological diversity.

However, that approach cannot conserve species whose habitats are particularly susceptible to loss or damage by forest practices.

Therefore, the Code provides for government officials to designate threatened and other susceptible species as "identified wildlife." Resource agencies can establish wildlife habitat areas (WHAs) for identified wildlife and apply species-specific general wildlife measures within those WHAs. In addition, interim measures can be implemented while WHAs are going through the establishment process.

The Forest Practices Board (the Board), has dealt with identified wildlife conservation issues on several occasions. Sometimes, conservation of an identified species has arisen in a complaint or audit. The Board has also participated in appeals of approved forest practices that impact identified wildlife. Most often, the identified wildlife species of concern has been the marbled murrelet (MAMU), a small seabird that nests in relatively large patches of old forest. The importance of patch size is uncertain, but patches in the 50- to 200-hectare range are probably desirable.

Results of past Board work

In a complaint investigation on southwestern Vancouver Island, completed in late 2001, the Board had concerns with how the Ministry of Forests and the Ministry of Water, Land and Air Protection had agreed to manage risk to MAMU in approving cutblocks in old coastal forests.[i] The two agencies agreed to allow road building and logging in 11 of 15 cutblocks proposed in scarce old-growth forest, in a watershed with very high-quality MAMU nesting habitat. The agencies considered the activities to be acceptable because they would not "severely and irreparably damage" MAMU populations. The Board questioned whether such a standard was appropriate for a threatened species such as MAMU. The Board recommended in late 2001 that government accelerate the establishment of WHAs.

In an audit on the southern mainland coast in 2000, the Board commended the Sunshine Coast Forest District for having interim measures in place to protect MAMU nesting habitat in their small business program.[ii] That pro-active measure helped to bridge a gap in the Code with respect to protection of non-timber resources. However, the Board was concerned that, until higher level plans and landscape unit objectives were legally established, there was no obligation under the Code to adequately protect MAMU habitat.

The Board has appealed approvals of two forest development plans because they did not adequately manage MAMU. In 2000, the Board argued that a Queen Charlotte Islands forest development plan did not adequately conserve MAMU when it included logging in areas of high importance to MAMU.[iii] The Forest Appeals Commission has not yet decided that case. In 2001, the Board requested a review of the approval of road construction and harvesting of a cutblock at the head of Jervis Inlet, on the southern BC coast.[iv] The Board noted that the block had the attributes of good nesting habitat for MAMU. The review panel rescinded the plan approval because the plan contained no information at all about conservation of marbled murrelets.

Experience with such issues has led the Board to conclude that the Code's MAMU conservation planning regime has not worked very well. Even where murrelet habitat has been extensively logged, the conservation of remaining habitat has been limited and slow. Now, the regulation of forest practices is moving away from structured planning and toward management by objectives and strategies. There is no specific provision in the *Forest and Range Practices Act* for identified wildlife. Nevertheless, government will be setting objectives for wildlife, so it is likely that the conservation of MAMU through designation of WHAs will continue in some form.

It is timely to take stock of what the Board has observed and make recommendations for MAMU habitat conservation under an objectives-based forest management regime.

The Board's assessment of MAMU habitat conservation

The Forest Practices Code's MAMU habitat management regime

Marbled murrelets are small seabirds that live along the Pacific coast of North America. Unlike most other threatened species, MAMU are relatively abundant; perhaps 65,000 live along the coast of BC, another 18,000 along the Washington, Oregon and California coasts and some 500,000 in coastal Alaska.[v] Nevertheless, MAMU have been listed as threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) since 1990.

Unlike many threatened species, MAMU are included because of population trend, not population size. Although trend data is very sparse, all anecdotal evidence, and most of the quantitative data, indicates declines in population over the past century.[vi]

Marbled murrelets swim much better than they fly, and need specific habitat.

Photo: Gus van Vliet

MAMU are also on BC's "red list" of species that are threatened, endangered or a candidate for such designation. There are threats to adult survival at sea. Starvation, predation, oil spills and drowning by entanglement in fishing nets are probable causes of mortality. It is still impossible to assess the significance of such losses as compared to losses of adults and young during nesting.[vii] However, continuing loss of nesting habitat through forest practices is a major threat.[viii] The population along the southern mainland coast is particularly depleted to the point where government has, for some years, deemed it critical to conserve MAMU nesting habitat in that part of the seabird's range.[ix] The population along southeastern Vancouver Island is also seriously depleted.

Inventory of actual nesting sites in BC is still sparse, with fewer than 200 nests found to date. MAMU typically nest on thick masses of moss on large-diameter branches of various species of conifers. The nest sites are typically in structurally-complex forest because MAMU, being poor fliers, need canopy openings beside and below nest sites for access. Large, mossy branches in complex forest stands occur in old

forests (more than 140 years old), especially those below 1,000 metres elevation.[x] MAMU generally prefer to nest within 50 kilometres of the ocean.[xi]

There is now evidence that populations of MAMU are directly related to the availability of suitable old-growth forest.[xii] MAMU apparently will not concentrate into pockets of remaining habitats if other habitat has been made unsuitable, so a reduction in the area of suitable forest will probably result in a corresponding reduction in the number of nesting MAMU.[xiii]

Effectiveness of wildlife habitat areas in conserving MAMU habitat

The Code includes methods to set aside forest habitat as Wildlife Habitat Areas (WHAs) specifically for MAMU conservation. However, the Board believes that government has taken an inappropriately long time to designate WHAs for MAMU.

Since 1995, the government's objective has been to manage MAMU habitat at the landscape unit level—typically 50,000- to 100,000-hectare units. The objective was to maintain 10 to 12 percent of originally-suitable nesting habitat, largely through the establishment of WHAs. WHAs are designed to minimize roads or harvesting that disturbs or alters habitat from the old forest conditions that MAMU require.

A federal recovery strategy for MAMU in Canada is being revised, and a conservation assessment is being produced in BC by the multi-agency Canadian Marbled Murrelet Recovery Team.[xiv] That strategy is not binding on the province, but constitutes advice from a well-informed academic, scientific and technical body. The original Code objective of maintaining 10 to 12 percent of habitat, as described above, has now been reconsidered, in part because it was somewhat arbitrary.

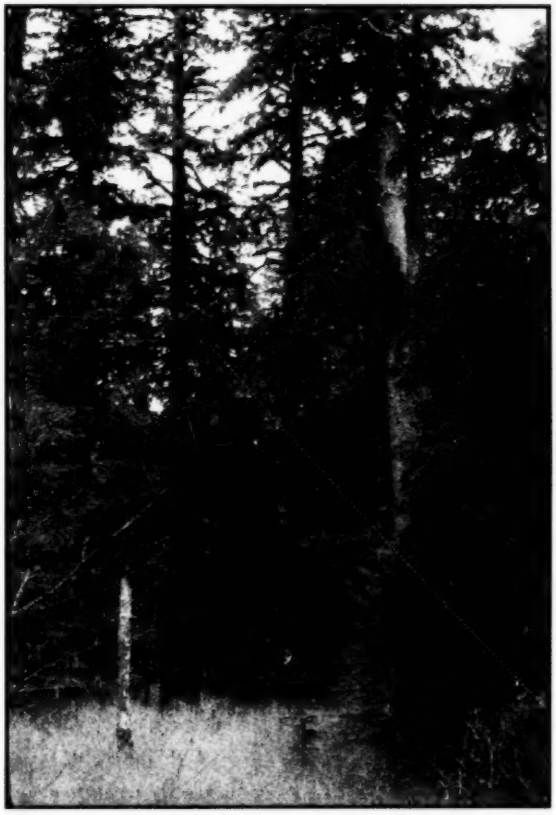
The new plan for MAMU recovery assumes that harvesting of BC's old growth forest will continue. The conservation assessment will probably accept a population reduction of up to 30 percent over the next 30 years. Slowing further MAMU decline to that rate would mean that the species, in 2032, would no longer be considered threatened by COSEWIC. MAMU would be delisted and be classified as "special concern." Eventual removal of MAMU from the list of species at risk is the primary long-term management goal. To that end, the conservation assessment is considering specific objectives for MAMU population decline in each of six "conservation regions" for the species: west and north Vancouver Island; east Vancouver Island; southern mainland coast; central mainland coast; northern mainland coast; and the Queen Charlotte Islands. The anticipated population decline would not be equal in all areas. Smaller declines would be managed for in areas where MAMU nesting habitat is already severely depleted.

Thus, the plan for east Vancouver Island and the southern mainland coast would be to limit further population decline to less than 10 percent in the next 30 years, balanced against slightly more than 30 percent anticipated population decline in other conservation regions.

In addition to accepting significant future MAMU population declines, the conservation assessment anticipates using large-scale logging operations in MAMU nesting habitats as opportunities to study the effect of habitat loss, habitat fragmentation, patch size and increasing forest edge effects on MAMU. The information should help refine future harvest prescriptions to improve conditions for MAMU in managed forests.[xv]

The selection of WHAs for MAMU nesting should be based on inventory of suitable nesting habitat. However, proof of MAMU nesting is very difficult to find. Adult MAMU are difficult to count, as they fly to and from their nests in low light conditions to reduce predation. Radar has been successfully used to count MAMU flying into specific valleys, but that cannot pinpoint the actual nest locations in each valley. Nests are widely dispersed, even in good quality habitat.

The first WHA for MAMU was designated in 2001, two years after government policy recognized that MAMU habitat conservation was critical in some parts of southwestern BC. By January 2003, there were only 19 WHAs designated for this seabird, covering some 5,650 hectares (although another 113 were at various stages of consideration).



This Sitka spruce stand makes good marbled murrelet nesting habitat, with its thick, moss-covered branches and complex canopy structure.

Photo: Alan Burger

Under the Forest Practices Code, habitat conservation for MAMU has taken place at the strategic or landscape planning level. However, until WHAs are actually designated, forest practices continue to be approved at the operational level. The effect is that future options for adequately managing and conserving MAMU nesting habitat at the landscape unit level have been, and continue to be, progressively eliminated.

That elimination can occur rapidly. For example, as part of an appeal of a forest development plan, the Board examined rate of loss of potential MAMU habitat in the Sunshine Coast Forest District between 1995 and 2001. Forest cover map information for 1995 indicated 173 potential WHAs in the district. Those potential areas met some basic attributes for MAMU WHAs described in policy at that time: at least 200 hectares in size, largely composed of old forest (older than 140 years, with over 250 years preferred), and taller than 20 metres.

In late 2001, Board contractors overlaid those areas with both approved and developed cutblocks and roads as of 2001. Twenty-five percent (43 of 173 potential WHAs, covering 21 percent of the area) of the potential MAMU habitat areas that had existed in 1995 had been fragmented by proposed or approved cutblocks so that they no longer met the size criteria (since reduced, to reflect more recent findings) for potential MAMU habitat. Another 19 percent (33) had been fragmented to the point that it was uncertain, without fieldwork, whether they still met minimum requirements for suitability.

Thus, the Board found that somewhere between 25 and 44 percent of the potential WHAs for MAMU that had been available in 1995 was no longer available only six years later.[xvi] The analytical methodology was not sophisticated, but the conclusion is probably realistic. There is rapid loss of potential MAMU habitat as harvesting of BC's old-growth forest continues.

Landscape level plans continue to be developed, but slowly. WHA designation did not normally occur until landscape level planning was completed, or nearly so. There have also been significant delays due to imposition of a one percent timber supply impact limit. That cap created a requirement to evaluate each proposed WHA for the cumulative impact on timber supply at all levels.[xvii] Finally, there has been the difficulty in determining the attributes of good MAMU nesting habitat and confirming actual MAMU use of probable habitats. The resulting delay has acted against MAMU conservation because forest practices continue to be approved while WHAs are planned and proposed. The Board therefore concluded that, at least in areas like the southern mainland where MAMU were already severely depleted, the WHA designation procedure in the Code has been too slow to be effective.

Considerations for MAMU habitat conservation

The Board believes that the current Code did not adequately manage MAMU nesting habitat in a timely fashion, so what is the likelihood that an objectives-based regime could do so? What can the Board suggest that could improve future habitat conservation for this susceptible seabird?

The implications of an objectives-based conservation regime

The *Forest and Range Practices Act*, with its objectives-based forest management regime, provides for brief forest stewardship plans and a much-reduced planning role. This is unlikely to facilitate MAMU habitat conservation. However, joint ministry designation of WHAs is no longer proposed, and single-agency approval should be faster. The WHA designation process is being revised to some extent. Nevertheless, past delays in both the setting of landscape level objectives and the designation of WHAs may well continue as some 100 to 150 sustainable resource management plans are drafted. Plan completion will take some time, so objectives-based habitat conservation is unlikely to slow the rate of decline of MAMU in southern coastal BC.

Still, there may be ways to speed the process. Currently, there are nine steps in the establishment process, involving consultations, evaluations and reviews by government plus affected licensees.[xviii] One step in particular — the evaluation of each WHA proposal with respect to the cumulative impact on timber supply, in conjunction with a cap of a one percent limit on such impact — has taken a great deal of time. Committees tend to be quite large, and therefore cumbersome. The wildlife habitat technical committee has nine members, for example. The establishment process should be expedited. In addition, licensees could be quite effective in identifying and proposing suitable WHAs themselves, especially if they could propose areas in locations that would be least disruptive to their planned operations.

What is needed, in the Board's view, is a simpler procedure, one that has incentives for both licensees and government to work together to conserve the required amount of forest that contains good MAMU nesting habitat.

A margin of safety is also important when conserving species that are especially sensitive to forest practices. There is a need for caution in the face of limited information. Caution is not mandatory in the *Forest Practices Code of British Columbia Act* or the *Forest and Range Practices Act*. However, the provincial government has signed the *Accord for the Protection of Species at Risk* to work with federal, provincial and territorial governments on a common approach to protecting species at risk in Canada. The federal *Species at Risk Act*, due to come into force in 2003, will presumably be matched by complementary provincial legislation and programs to protect habitat and species at risk, including MAMU. Therefore, it seems prudent to apply cautious management principles to the conservation of habitats of species at risk.

The Board concludes that, where forest practices are likely to aggravate already severely depleted MAMU habitat, lack of precise inventory or habitat suitability information should not delay the designation of WHAs or implementation of protective management practices within such areas. WHAs should be created proactively. They can be refined later.

Incentives for timely conservation of MAMU habitat

The *Forest Practices Code of British Columbia Act* involves careful review and approval of intricate operational plans. It also sets out habitat conservation strategies for identified wildlife such as MAMU, in the form of WHAs and interim measures. Nevertheless, that regime has, in the Board's experience, failed to adequately conserve habitat for MAMU.

The *Forest and Range Practices Act* reduces planning and approval requirements but provides for the needs of identified wildlife through objectives that are yet to be determined. Forest and range practices must be consistent with such objectives. The policy measures and implementation procedures for management of identified wildlife that are in place under the *Forest Practices Code of British Columbia Act* are being modified to some extent. They will probably be applied under the *Forest and Range Practices Act* because the policy outlines best management practices to achieve conservation of species at risk from forest and range practices.

Therefore, except where modified to reflect the revised MAMU recovery plan and some procedural changes, there is likely to be little significant change in MAMU habitat management between the two regulatory regimes. As a result, inappropriate delays in applying habitat conservation measures may continue.

One possible reason for delayed habitat conservation in the past is the lack of incentive for government agencies or for licensees to agree on the designation of MAMU WHAs. In fact, there are probably economic incentives to delay. Licensees can apply for cutblocks and roads in potential MAMU habitat until a WHA is actually established. By applying for cutting permits in remaining old growth, a licensee benefits by keeping future options open. Approval gives a licensee the option of whether or not to proceed. Even if the timber is of low to moderate value, retaining that option would normally be preferable to waiting and possibly being barred from potentially operable forest in a new WHA.

That issue was raised in a complaint to the Board.[xix] The complainant asserted that a licensee deliberately applied for cutblock approvals in areas that had high biodiversity and important wildlife values. The complainant believed this had been done specifically to prevent those areas from being set aside as WHAs. In that case, the Board found the assertion to be unsubstantiated. Nevertheless, the complaint did highlight a potential problem.

A regime that provides no incentive for cautious management, and that may include some incentive to delay, seems inappropriate for MAMU habitat conservation. Conservation options are lost with delay. Instead, the regulatory regime should encourage prompt interim protection of the most important habitat. It is equally required, however, that valuable forest resources should not be tied up unnecessarily. Prompt refinement of WHA boundaries is also important. There should be incentives for both government and licensees to designate and to refine WHAs for MAMU. Licensee incentive is especially important in an objectives-based regime, where licensees decide how best to meet broad government objectives.

Desirable features in an objectives-based regime for effective MAMU conservation

The multi-agency recovery strategy will probably encourage policies to restrict a MAMU population decline to something less than 30 percent over 30 years. It is prudent for recovery plans to anticipate that harvesting BC's old growth forest will continue. It is logical to zone coastal BC into conservation regions for MAMU, with specific objectives for each region. MAMU habitat conservation efforts should be focused primarily on the best remaining areas. However, the range of the species should be maintained, so conservation should also be directed to parts of the coast where nesting habitat has already been significantly depleted.

In terms of a forest practices regulatory regime, the Board agrees with the elimination of joint approvals for WHAs for identified wildlife. Practically, there is just one provincial government,

not a spectrum of interest-based resource agencies. One arm of the government, the Ministry of Sustainable Resource Management, is to make the strategic planning decisions on objectives regarding MAMU habitat conservation. It is at that level that the complex task of balancing economic, social and environmental values take place, as indicated by the policy proposed in the recent discussion paper on *"A Working Forest for British Columbia."*[xx] Subject to such strategic guidance, the Board anticipates that the objectives for MAMU habitat management will generally reflect the priorities of the MAMU recovery team, including management variation based on the conservation regions.

Once the MAMU nesting habitat requirements have been established, another arm of the government, presumably the Ministry of Water, Land and Air Protection, will decide which areas appear to have the attributes that reflect potentially good habitat. This is where management caution should be applied. The previous regulatory regime demonstrated that there is not enough time to base the designation of WHAs on inventories. Creating inventories of utilized MAMU nesting habitat is too difficult, and the BC coastal areas are too vast. Instead, the best economically-efficient information should be used to rapidly designate potential remaining habitats as interim WHAs.

Simply put, government should designate interim WHAs using indicators and professional assessments that are available, despite limitations in accuracy or in scientific support. It is impractical to wait until researchers decide whether losses of adults at sea or losses of nestlings ashore are the most important factors in MAMU decline. It is likewise impractical to wait until all of the attributes of MAMU nesting habitat are identified. Instead, habitat features recommended in the most recently revised identified wildlife management strategy for MAMU should be used as is — unless and until better, site-specific information is available.

Economic factors will need to be dealt with so that the costs of public objectives for MAMU conservation do not fall disproportionately on licensees. If government believes there is a need for some form of compensation for designating interim WHAs, there could be compensatory regulation of forest practices outside of MAMU habitats. For instance, affected licensees could be allowed a relaxation of rules that limit clearcut size or the time required for cutblock to re-grow before adjacent blocks can be harvested. The main point here is that interim WHAs need to be designated promptly for MAMU.

The next logical step also has an economic impetus. Those interim WHAs should be efficiently refined so that valuable forest resources not needed by MAMU are available for harvest. Risk assessment could follow, to focus efforts to refine inventory and especially WHA boundaries. This is where the Board sees an opportunity for incentives for industry. There would be some incentive in getting access to timber in a WHA that may not actually be needed for MAMU. If a licensee determines that timber values and operating costs make harvesting in part of a particular MAMU WHA feasible, the licensee will probably be willing to invest in the cost of surveys to determine whether or not those portions of the WHA are good MAMU nesting habitat. If inventory or other data can show that MAMU nesting capability is low or that

MAMU are persistently not using the area, the area would be removed from WHA designation and made available for harvesting by that licensee.

There could also be incentives through adaptive management in portions of some WHAs. That would involve allowing limited harvesting (65 percent retention, single stem removal, for example) with the licensee monitoring and reporting on nesting success in both the harvested and non-harvested units. That would allow continued refinement of knowledge of the habitat requirements of MAMU.

If incentives are used, there may be a need to counter the "free-rider" effect where some licensees benefit by waiting until another licensee has undertaken the necessary studies to make some interim WHA timber available for harvesting. That effect is most likely to arise among licensees with volume-based rather than area-based tenures. One way to allocate inventory costs may be through the *Forest and Range Practices Act*, which allows the minister to specify proportional targets among licensees to share responsibility.

Whatever the mechanism, there should be no obligation on licensees to carry out inventories or adaptive management. However, licensees would be able to factor the cost of carrying out such studies into other operational costs, allowing a sound fiscal analysis. The key here is that market forces and fiscal incentives should drive refinement of MAMU habitat information and, indirectly, MAMU conservation, rather than encouraging delay.

It is important that government, industry and other stakeholders agree on clear, measurable results that reflect the revised MAMU recovery strategy. For example, there are various ways to express a result that would meet an objective of maintaining a particular local population of 15,000 MAMU. This could mean an objective of minimizing impacts, of maintaining that population size or of maintaining enough habitat for that population. But the choice should be based on measurability. A general result of "minimizing the impacts of forest practices on remaining MAMU nesting habitat", for example, would be neither clear nor measurable. A result of "maintaining a population of 15,000 MAMU" would be clear, but difficult to measure. A result specified as "apparently-suitable nesting habitat (older than 140 years and below 1,000 metres elevation, for example)" would be both clear and measurable. Assuming that 80 percent of MAMU are adults and half of those are females, a population of 15,000 MAMU would have some 6,000 breeding females. If MAMU nesting density is about 0.8 nests per hectare, a suitable result could be 7,200 hectares of nesting habitat.

Licensees need to adopt clear strategies and methodologies if they decide to measure MAMU nesting use and the potential to gain access to more timber. Government will also need to establish reliable means to measure the effectiveness of both government policies to conserve MAMU habitats and of licensee strategies to determine where WHAs can be trimmed of portions not needed for MAMU nesting.

Conclusions

The MAMU population will probably decline by almost one-third over the next 30 years due to loss of nesting habitat. Even though MAMU are considered identified wildlife because they require habitat that is particularly sensitive to loss due to forest practices, the Board's experience has been that the Code's MAMU conservation planning regime has not worked very well to this point. Conservation of remaining MAMU habitat in parts of BC where the habitat is already severely depleted has been limited and slow. Under the Code, forest practices were approved while MAMU habitat conservation awaited inventory and passed through a complex, slow impact assessment process. As a result, future options for MAMU habitat conservation have been rapidly lost. There is a risk that similar detrimental delays will continue under the *Forest and Range Practices Act* regulatory regime.

Identification of habitat suitable for MAMU nesting cannot be done in a timely fashion by relying on comprehensive inventory. Identification of habitat with readily-identifiable features thought to be important to MAMU must serve for interim conservation purposes. Conservation of habitat for identified wildlife such as MAMU should incorporate caution by conserving the required amount of apparently-suitable habitat in the short term.

Conservation of habitat for identified wildlife such as MAMU should also incorporate incentives for licensees and government to collect information to refine interim habitat set-asides to efficiently remove areas that do not in fact constitute suitable MAMU nesting habitat. MAMU habitat conservation objectives, strategies and results must be framed in clear, measurable terms.

[i] Forest Practices Board, 2001. *Was marbled murrelet habitat adequately protected in the Brand Valley?* FPB/IRC/57. See http://www.fpb.gov.bc.ca/COMPLAINTS/irc57/IRC57s.htm.

[iii] Forest Practices Board, 2000. *Audit of forest planning and practices – Small Business Forest Enterprise Program, Sunshine Coast Forest District* FPB/ARC/28. See http://www.fpb.gov.bc.ca/AUDITS/arc28/arc28.pdf

[iii] 2000. Forest Practices Board submission, Forest Appeals Commission Appeal No. 2000-FOR-009. See http://www.fpb.gov.bc.ca/REVIEWS/1999/11/review%20decision.htm.

[iv]2001. Review panel decision into the matter of approval of Forest Development Plan 2001-2005 for Forest Licence A19220. See http://www.fpb.gov.bc.ca/ra.htm.

[v] Burger, A. E., 2002. *Conservation assessment of Marbled Murrelets in British Columbia: A review of the biology, populations, habitat associations, and conservation* Canadian Wildlife Service Technical Series Report No. 387 **[Biological Review]** p. 30, 35.

[vi] Biological Review p. 34.

[vii] Biological Review p. 132.

[viii] Marbled Murrelet Recovery Team, in review. *Marbled Murrelet Conservation Assessment 2002, Part B – Marbled Murrelet Recovery Team advisory document on conservation and management.* Canadian Wildlife Service, Delta, BC. **[Discussion Paper]** p. 5.

[ix] BC Environment, 1999, *Managing Identified Wildlife: Procedures and measures, Volume 1* **[IWMS]** p. 71. The same strong point was made in the first MAMU recovery plan - see Kaiser et al., 1994. *National Recovery Plan for the Marbled Murrelet.* Report No. 8, Recovery of Nationally Endangered Wildlife Committee, Canadian Wildlife Service, Ottawa.

[x] Biological Review p. 43, 55, 115.

[xi] Discussion Paper p. 17.

[xii] Biological Review p. 71.

[xiii] Biological Review p. 77.

[xiv] The full conservation assessment has three parts: a "biological review" cited at footnote *v*, a "discussion paper" cited at footnote *viii* and an assessment of risks of alternative management policies.

[xv] Discussion Paper p. 9.

[xvi] Jones, T., 2001. Marbled murrelet wildlife habitat area status 2001 – An update to Manley and Jones (2000) Options for managing the nesting habitat of marbled murrelets in the Sunshine Coast Forest District. Unpubl. report, Forest Practices Board.

[xvii] IWMS p. 14.

[xviii] IWMS p. 12.

[xix] Forest Practices Board, 2002. *Conservation of Biodiversity and Wildlife Habitat in Forest Development Planning on the Sunshine Coast*, Report FPB/IRC/76.

[xxxx] Ministry of Sustainable Resource Development, 2003. *A Working Forest for British Columbia – Discussion Paper*. Released January 22, 2003 p. 8 and 14.

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